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OF

# LONDON

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# NEW MEALYBUGS FROM EAST AFRICA

By H. C. James, B.Sc., Ph.D.
(*Zoological Laboratory, Cambridge.*)

[Read 20th November, 1935.]

With Sixteen Figures.

## **Trionymus sanguineus** sp. n. (fig. 1).

Adult ♀ broadly ovate in outline; broadest across the mesothorax; thinly coated with white wax; short anal tassels present; ovisac white, cottony in texture, voluminous,

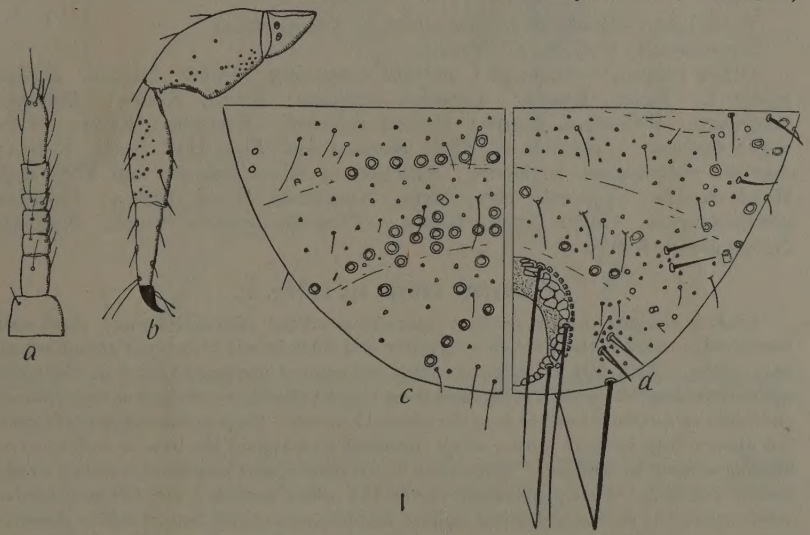


Fig. 1.—*Trionymus sanguineus* sp. n.—(*a*) antenna × 57; (*b*) posterior limb × 57; (*c*) posterior segments of abdomen. Ventral view × 150; (*d*) posterior segments of abdomen. Dorsal view × 150.

and appears to be secreted from all parts of the derm; ground-colour dark red. With only two pairs of cerarii, each cerarius possessing a pair of rather long slender spines. Derm setae scanty and of two types; (1) long and moderately stout, (2) shorter and usually finer; marginally on each side of abdomen are pairs of elongate setae which may be homologous with cerarian spines but are rather remotely situated from each other. Three types of dermal pores occur; (*a*) circular multilocular pores are present on both dorsum and venter but are specially numerous on the posterior ventral region of abdomen; (*b*) circular pores of three distinct sizes which form the outlets of tubular ducts; the largest of these have somewhat irregular lips; *i.e.* derm fairly evenly crowded with triangular pores. Posterior dorsal ostioles small and indistinct; anterior ostioles not detected; ventral cicatrice absent. Antennae short, commonly 7-segmented but segments 3 and 4 may be fused; segments in the following relative proportions: (1) 10, (2) 10, (3) 5, (4) 6, (5) 4, (6) 7,

(7) 19. Eyes small but clearly defined. Rostrum dimerous, about as broad as long; rostral loop extending nearly to base of 3rd pair of legs; terminal segment rather acutely pointed slightly longer than broad and about twice the length of the proximal segment. Legs markedly stout and fairly equal in size; femora and tibiae of the posterior limbs bear rather large translucent pores of uneven size; both ungual and tarsal digitules longer than claw and the unguals knobbed. The relative proportions of the segments of the legs are as follows :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 17 | 30 | 23 | 13 | 6 |
| Mid limb . . | 17 | 30 | 23 | 17 | 6 |
| Hind limb . . | 18 | 34 | 24 | 20 | 7 |

Anal lobes absent; caudal setae longer than anal ring setae :

Length of adult ♀ 1·90 mm.

Breadth of adult ♀ 1·50 mm. (under compression).

Type host :—Roots of *Bidens pilosa* L. (Compositae).

Type locality :—Kenya : Nyeri.

Other records :—Roots of : *Ethulia conyzoides.* Ruiru, Kenya; *Bidens pilosa* L. Ruiru, Kenya; *Vernonia cestifolia.* Ruiru, Kenya; *Erlangia marginata.* Komothai, Kenya; *Conyza volkensii.* Komothai, Kenya; *Vernonia lasiopus.* Junction of River Samuru and Fort Hall Road, Kenya; *Justicia melampyram* S. Moore. Junction of River Samuru and Fort Hall Road, Kenya; *Hypoestes verticillaris.* Kumakwa, Nyeri, Kenya; *Cynodon plectostachyum.* Gititu Nyeri, Kenya; *Themeda triandra* Forsk. Nairobi, Ngong Road, Kenya.

### **Trionymus sativus** sp. n. (fig. 2).

Adult ♀ elongate oval in outline; sparsely powdered with white wax; short anal tassels only; ovisac cottony tinged with yellow and voluminous; oviparous; ground-colour pale yellow. With only two pairs of cerarii, the paranal lobe pair situated on sclerotised areas of the derm although in some cases these may be absent; ventrally a narrow diffused chitinised area extends forward from the paranal lobe seta; the penultimate pairs of cerarii not always fully formed; with a small chitinised area around the base of each spine or these areas may be confluent. Derm setae short, slender, and very scanty, except on the frons. Triangular derm pores occur evenly but rather sparsely; circular multilocular pores confined to ventral abdominal region; tubular ducts of two distinct calibre present; those of smaller diameter are very numerous in the posterior ventral area of abdomen, those of larger diameter are few in number and scattered. Anterior and posterior ostioles small, appearing as mere slits; ventral cicatrice absent. Antennae 7-segmented arranged in the following proportions : (1) 13, (2) 12, (3) 10, (4) 9, (5) 7, (6) 9, (7) 23; eyes pigmented, protuberant, and somewhat larger. Rostrum dimerous, short and broad, nearly as broad as long; rostral loop extending nearly to base of 2nd pair of legs. Legs slender and the segments arranged in the following average proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 19 | 41 | 32 | 22 | 5 |
| Mid limb . . | 20 | 43 | 34 | 21 | 5 |
| Hind limb . . | 22 | 48 | 44 | 23 | 5 |

Translucent pores present on the coxae and outer margin of the tibiae of hind limbs; ungual digitules knobbed and slightly longer than claw; tarsals filiform and not knobbed. Anal ring and genital aperture rather heavily chitinised; anal lobes only slightly developed; anal ring setae short and only one-half length of anal lobe setae.

Length varies from 1·50 mm. to 2·45 mm.; breadth from 1·12 mm. to 1·56 mm.

Type host :—Roots of *Leonotis nepetaefolia* R. Br.
Type locality :—KENYA : Murera, Ruiru.
Other records :—Roots of : *Coleus comosus* Hochst. Murera, Ruiru, Kenya; *Leonotis nepetaefolia* R. Br. Komothai, Kenya, and Kibirie, Nairobi,

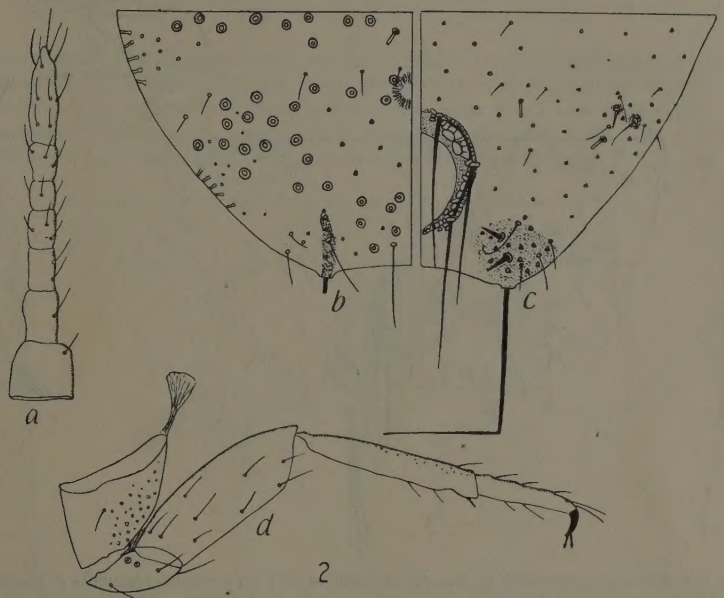


FIG. 2.—*Trionymus sativus* sp. n.—(*a*) antenna × 57; (*b*) posterior abdominal segments. Venter × 170; (*c*) posterior abdominal segments. Dorsum × 170; (*d*) posterior limb × 57.

Ngong Road, Gituambu Mitubiri, Kenya; *Hypoestes verticillaris* R. Br. Masai Reserve, Nairobi, Ngong Road; *Leonotis nepetaefolia* R. Br. Ruiru, Kenya; *Bidens pilosa* L. Ruiru.

### **Trionymus sporoboli** sp. n. (fig. 3).

Adult ♀ elongate oval; sparsely covered with white wax; no tassels; ovisac large; ground-colour reddish-brown. With one pair of cerarii situated on the paranal lobes; each with two slender rather elongate spines. Body setae long and sparse. Circular multilocular pores numerous in posterior ventral abdominal region but a few occur in the anterior region of venter and on the dorsum. Anterior and posterior ostioles large and well defined; ventral cicatrice absent in specimens examined. Antennae 7-segmented in the following average proportions : (1) 15, (2) 14, (3) 7, (4) 10, (5) 5, (6) 8, (7) 21. Eyes prominent and pigmented. Rostrum dimerous short and about as broad as long; rostral loop extends to base of 2nd pair of legs. Legs slender in the following proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 20 | 43 | 33 | 17 | 5 |
| Mid limb . . | 19 | 42 | 34 | 17 | 5 |
| Hind limb . . | 21 | 46 | 42 | 23 | 5 |

Coxae of hind limb with translucent pores; claw without denticle; ungual digitules slightly longer than claw and knobbed; tarsals longer than unguals and with smaller terminal knob. Anal ring setae short and slender; caudal setae short, stout, and each tri-ramose. First-instar larvae almost fully formed in ova before oviposition.

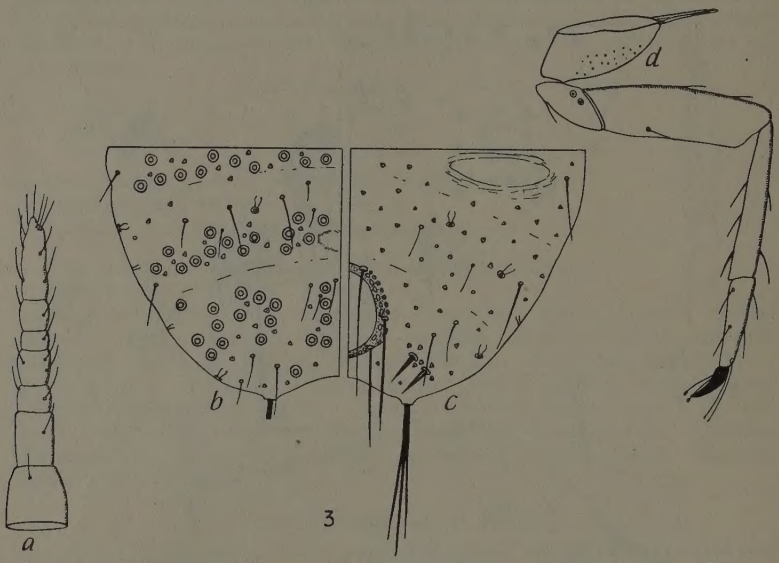


FIG. 3.—*Trionymus sporoboli* sp. n.—(*a*) antenna × 57; (*b*) posterior segments of abdomen. Ventral aspect × 150; (*c*) posterior segments of abdomen. Dorsal aspect × 150; (*d*) posterior limb × 57.

Length of adult body varies from 1·70 mm. to 2·10 mm.; breadth (under compression) from 0·97 mm. to 1·26 mm. This species is characterised by the tri-ramose condition of the anal lobe setae.

Type host :—Roots of *Sporobolus phillippi* (Compositae).

Type locality :—KENYA : Murera, Ruiru.

Three specimens only of this species were obtained and the caudal setae of one were lacking. The caudal setae of the perfect specimens are tri-ramose.

### **Trionymus praegrandis** sp. n. (fig. 4).

Young ♀♀ broadly ovate but mature specimens are very elongate with sides almost parallel. With one pair of cerarii situated on the paranal lobes; each cerarius with a pair of slender spines surrounded by only a few triangular pores; associated with the cerarian spines are a number of stout auxiliary setae with flagellate extremities. Triangular pores sparsely distributed over derm; circular multilocular pores almost confined to ventral region of posterior abdominal segments; a few tubular ducts also open on the derm. Anterior and posterior ostioles well defined; ventral cicatrice absent. The body setae practically confined to the last three or four abdominal segments; on remainder of derm extremely scanty but with similar flagellate extremities. Antennae 7-segmented (occasionally 8-segmented) and relatively short and stout. The segments in the following average proportions : (1) 15, (2) 14, (3) 7, (4) 10, (5) 9, (6) 12, (7) 25. Eyes pigmented and

relatively small. Rostrum dimerous. The segments of the legs have the following relative lengths :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 22 | 50 | 35 | 20 | 7 |
| Mid limb . . | 22 | 54 | 37 | 21 | 7 |
| Hind limb . . | 22 | 55 | 46 | 25 | 10 |

Ungual digitules slightly longer than claw and knobbed; tarsals longer than claw and the terminal knob is smaller. Spiracles large, the posterior pair slightly the larger; both pairs with large trumpet-like stigmata derm; triangular pores tend to aggregate near the stigmata. Embryos reach an advanced stage of development in the body of female.

Length of body varies from 4 mm. to 6·50 mm.; breadth from 3 mm. to 3·25 mm.

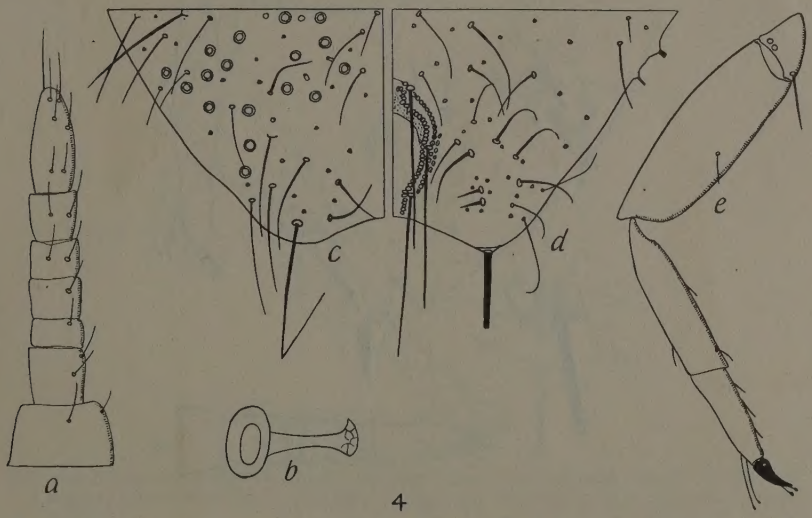


Fig. 4.—*Trionymus praegrandis* sp. n.—(*a*) antenna × 57; (*b*) spiracle × 182; (*c*) posterior segments of abdomen. Venter × 150; (*d*) posterior segments of abdomen. Dorsum × 150; (*e*) posterior limb × 57.

Type host :—Material received from Mr. H. Hargreaves of the Agricultural Department, Uganda, who described it as occurring on stems and under leaf-bases of the grass " akalungu."

Type locality :—Uganda : Kampala.

### **Trionymus panici** sp. n. (fig. 5).

Adult ♀ red dusted with white wax; tassels absent; ovisac not observed. A pair of cerarii situated on the paranal and penultimate segments; each cerarius with two rather elongate slender spines; aggregations of triangular pores around paranal cerarii more pronounced than those of the penultimate pair; auxiliary setae few short and fine; anal lobes only slightly developed; caudal setae longer and stouter than anal ring setae. Body setae of two distinct categories; (1) longer and stouter and confined almost entirely to the posterior dorsal and ventral region of abdomen and to the frons, (2) shorter and finer scattered sparsely over the entire derm. Rostrum dimerous long and somewhat

slender; distal segment about 2½ times length of proximal; length of rostrum 1½ times its greatest width; rostral loop extends to region of middle pair of legs. Anterior pair of spiracles slightly smaller than the posterior pair. Legs stout in the following relative proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| I . . . | 17 | 35 | 25 | 13 | 6 |
| II . . . | 18 | 33 | 28 | 17 | 6 |
| III . . . | 21 | 41 | 33 | 16 | 6 |

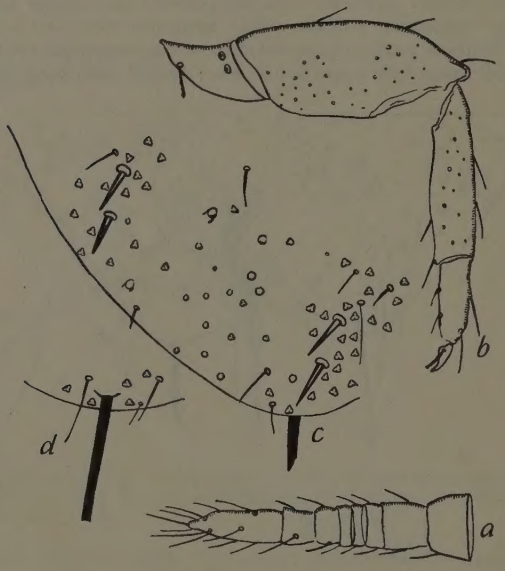


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FIG. 5.—*Trionymus panici* sp. n.—(*a*) antenna × 57; (*b*) posterior limb × 57; (*c*) penultimate and paranal cerarii, left side × 250; (*d*) anal lobe, ventral aspect, right side × 250.

Translucent pores present on hind femora and tibiae; ungual digitules extend to extremity of claw and are slightly expanded distally; tarsals filiform and do not exceed length of claw. Antennae short, 7- or 8-segmented, segments 3 and 4 often coalesced; all segments vary considerably in length.

Length of ♀ 2·30 mm. to 2·90 mm.; breadth from 1·20 mm. to 2·20 mm.

Type host :—*Panicum maximum* Jacq.

Type locality :—KENYA : Mtwapa Road, Mombasa.

This species is allied to *T. sanguineus* but may be differentiated by the longer and more slender rostrum, and the different shape of the antennae.

### **Trionymus insularis** sp. n. (fig. 6).

Adult ♀ elongate, greenish-brown, dusted with white wax; two pairs of short caudal tassels only. With only two pairs of cerarii; each cerarius with a pair of spines; aggregation of triangular derm pores around the cerarii small; paranal cerarii each with three

rather elongate auxiliary setae. Body setae scanty except on frons and on the postero-dorsal and ventral region of the abdomen; caudal setae much longer and stouter than anal ring setae; anal lobes absent. Legs slender in the following relative proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 17 | 42 | 35 | 21 | 5 |
| Mid limb . . | 17 | 43 | 37 | 20 | 5 |
| Hind limb . . | 20 | 49 | 43 | 25 | 4 |

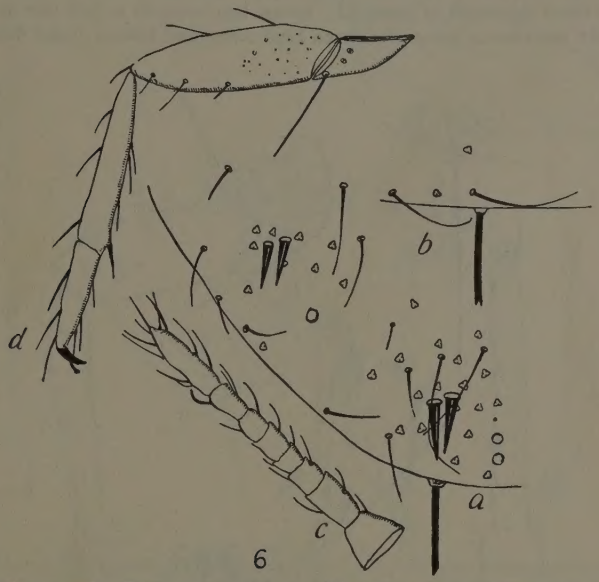


FIG. 6.—*Trionymus insularis* sp. n.—(*a*) penultimate and paranal cerarii × 250; (*b*) ventral aspect near left caudal seta × 250; (*c*) antenna × 57; (*d*) posterior limb × 57.

A few translucent pores of uneven size present on the proximal third of hind femora; ungual digitules stout and slightly longer than claw and knobbed; tarsals longer than unguals and with smaller terminal knobs. Rostrum dimerous; distal segment twice length of proximal; rostral loop very short. Anterior and posterior dorsal ostioles slit-like and inconspicuous; ventral cicatrice absent in specimens examined. Antennae 8-segmented in the following proportions : (1) 10, (2) 12, (3) 6, (4) 5, (5) 7, (6) 6, (7) 9, (8) 21.

Length of adult ♀ 2·60 mm.; breadth 1·40 mm.

Type host :—Roots of grasses (undet.).

Type locality :—KENYA : Kilindini Island, Mombasa.

### **Trionymus sericeus** sp. n. (fig. 7).

Adult ♀ elongate oval; ovisac voluminous, silky buff-tinted, and envelopes female; body content purplish-black; six or seven pairs of cerarii on the posterior abdominal segments, each cerarius with two spines, those of the anterior pairs somewhat remotely situated from each other; no aggregation of wax pores around cerarii; paranal cerarii with two or three short auxiliary setae; spine areas of paranal cerarii slightly chitinised. Body

setae very stout and short; the bases of these setae and sometimes those of the cerarian spines somewhat contracted giving them a spindle-shaped appearance; body setae longer and more numerous ventrally. Triangular pores evenly distributed but not numerous; circular multilocular pores almost confined to postero-ventral area of abdomen; tubular ducts commonest also in the posterior region of body. Posterior ostioles small and not well defined; anterior dorsal ostioles not detected; ventral cicatrice absent. Antennae relatively short, 7-segmented, the joints in the following proportions: (1) 15, (2) 11, (3) 10, (4) 10, (5) 7, (6) 10, (7) 17; eyes prominent and protuberant; rostrum dimerous; distal segment 1·5 times the length of proximal; rostral loop extends to 2nd pair of legs; legs fully formed; translucent pores present on hind coxae and tibiae; tarsal digitules long

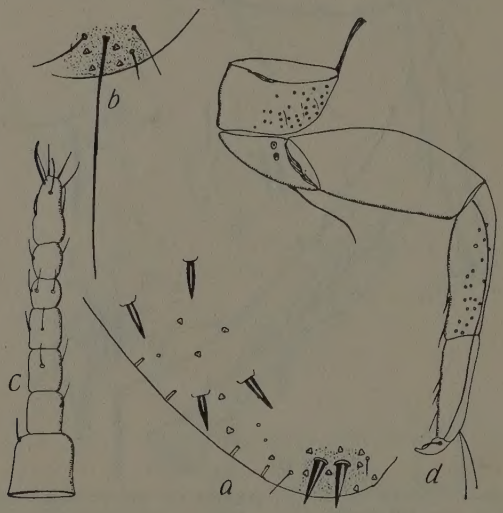


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Fig. 7.—*Trionymus sericeus* sp. n.—(*a*) posterior three cerarii of left side × 250; (*b*) anal lobe, right side × 250; (*c*) antenna × 57; (*d*) posterior limb × 57.

setiform and knobbed; unguals present but not in a sufficiently good state of preservation to allow of description; anal lobes prominent and somewhat chitinised; posterior spiracles larger than anterior pair.

Length of adult ♀ 4·40 mm.; breadth 2·30 mm.

Type host :—Leaves and stems of *Coffea arabica*.
Type locality :—Kenya : Kitale.

### **Phenacoccus locustus** sp. n. (fig. 8).

Adult ♀ elongate oval, thickly coated with white wax without definite pattern; marginal tassels short. With eighteen pairs of cerarii each with a pair of spines except pairs one, three and four which have three. All cerarian spines subequal in size, slender, and relatively small; a small chitinised area of derm present around anal lobe cerarii but does not extend to anal lobe setae; tendency for triangular pores to aggregate around the cerarian spines

slight; auxiliary setae usually absent and when present situated somewhat remotely from the cerarian spines. Circular multilocular pores present on both dorsum and venter, commonly in groups of three or four; tubular ducts with raised rims at mouth also occur. Derm setae mainly slender and scanty but a few are spine-like. Dorsal ostioles and ventral cicatrice apparently absent. Antennae 9-segmented in the following proportions: (1) 13, (2) 16, (3) 10, (4) 6, (5) 10, (6) 8, (7) 9, (8) 10, (9) 14. Rostrum dimerous, short and stout, about as broad as long, translucent pores on hind tibiae and femora; denticle on claw;

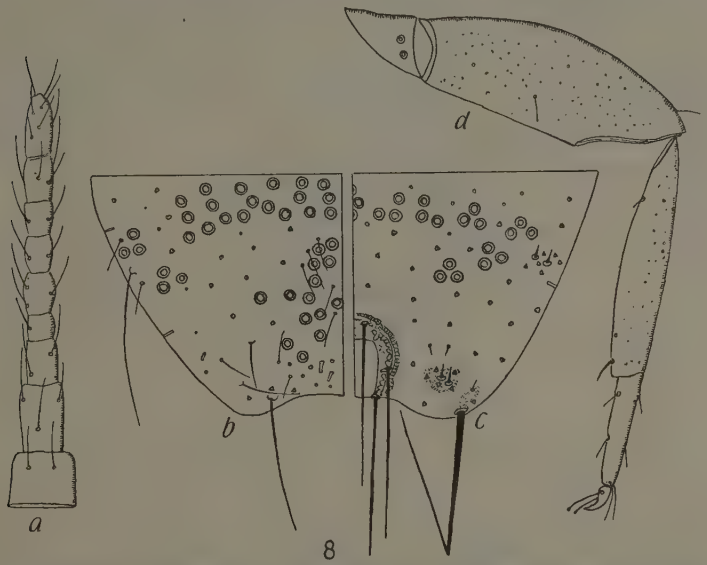


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FIG. 8.—*Phenacoccus locustus* sp. n.—(*a*) antenna × 57; (*b*) posterior segments of abdomen. Venter × 150; (*c*) posterior segments of abdomen. Dorsum × 150; (*d*) posterior limb × 57.

ungual digitules longer than claw and knobbed; tarsals filiform and not knobbed. The segments of the legs in the following proportions:—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 22 | 48 | 44 | 19 | 5·5 |
| Mid limb . . | 24 | 53 | 50 | 26 | 5·5 |
| Hind limb . . | 25 | 59 | 58 | 26 | 6 |

Anal lobes only slightly developed; caudal setae much stouter than anal ring setae and about half as long again.

Length 2·28 mm.; breadth 1·53 mm.

Type host:—Roots of *Hyparrhenia ruprechtii* Fourn.

Type locality:—KENYA: Kericho.

This species is very close to *P. cycliger* Leon. taken from *Fraxinus oxyphylla* (Maritime Alpes) (*P. de Peyerimhoff*) 1914 *ex coll.* A. Balachowsky. I was, however, given an opportunity of comparing the Kenya specimens with specimens of *cycliger* through the courtesy of Mr. Green. They differ in three significant respects, viz.:—

(1) The antennae of *locustus* are only about two-thirds the length of *cycliger*

and in addition are somewhat stouter; moreover, the corresponding joints of the antennae do not agree in length to a significant extent.

(2) The hind tibiae of *locustus* are somewhat dilated, whilst this tendency is not at all apparent in the hind tibiae of *cycliger*.

(3) The translucent pores present on the hind femora and tibiae of *locustus* are absent from these parts of *cycliger*.

Mr. Green suggests that *locustus* might be included with *P. cycliger* Leon., *P. oleae* Marchal and *P. balteatus* Green in a new genus.

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FIG. 9.—*Phenacoccus trispinosus* sp. n.—(*a*) antenna × 28; (*b*) posterior segments of abdomen. Venter × 150; (*c*) posterior segments of abdomen. Dorsum × 150; (*d*) mid limb × 28.

**Phenacoccus trispinosus** sp. n. (fig. 9).

A large ovoid species described from spirit material only, appearance in life unknown. With 19 pairs of cerarii, sometimes only 18 pairs, in which case the pair opposite the eyes is obliterated; the following average number of spines per cerarius (starting anteriorly) (1) 3, (2) 3, the 3rd to 18th inclusive with two spines, (19) 3; each cerarius with a cluster of triangular pores but with no auxiliary setae; cerarian spines long and slender; with the exception of the paranal cerarii the number of cerarian spines in excess of two are much reduced in size. Dorsal setae sparse and very spiniform; they may sometimes occur together in pairs which if situated marginally would be regarded as true cerarian spines; ventrally a number of longish setae present especially in the cephalic and abdominal

regions varying up to 200 μ in length; the setae on the abdomen are in transverse segmentary arrangement and the last five or six abdominal segments have a long seta ventromarginally on each side; a transverse row of 5 or 6 long setae present on the ventral aspects of segments 4, 5, 6 and 7. Circular multilocular pores present both on dorsum and venter in clusters of from 3 to 7, with which are almost invariably associated tubular ducts of large diameter; tubular ducts of small diameter also present. The clustered pores are markedly disposed in transverse series encircling each segment. Anterior and posterior ostioles small but distinct; ventral cicatrice large and subcircular. Antennae slender, 9-segmented in the following proportions: (1) 25, (2) 34, (3) 33, (4) 20, (5) 24, (6) 20, (7) 19, (8) 16, (9) 30. Eyes large, protuberant and pigmented. Rostrum dimerous. Posterior pair of spiracles slightly larger than the anterior pair. Legs long and somewhat pilose; coxae elongate; ungual digitules stout; longer than claw and knobbed tarsals filiform shorter than claw and not knobbed; claw with denticle. The segments of the legs in the following proportions:—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 40 | 104 | 111 | 40 | 9 |
| Mid limb . . | 44 | 115 | 122 | 40 | 9 |
| Hind limb . . | 48 | 136 | 140 | 43 | 8 |

Anal lobes small; anal lobe setae stouter than anal ring setae but only slightly longer.

Length from 3·0 mm. to 4·25 mm.; breadth 1·8 mm. to 2·5 mm.

This species also belongs to the *cycliger* group and differs from *locustus* in the much longer antennae and limbs and in the larger number of pores in each cluster.

Type host:—Roots and rhizomes of *Solanum tuberosum.*

Type locality:—Kenya: Kabete.

Other records:—The Insectaries, Scott Agricultural Laboratories, nr. Nairobi. On potato sprouts.

### **Pseudococcus longirostralis** sp. n. (fig. 10).

Adult ♀ coated with white wax without definite pattern; tassels present all round margin except posteriorly where they are slightly longer; ovisac not seen; body of rather high convexity dorsally; body content yellowish-green. With a complete marginal series of cerarii consisting of seventeen pairs with the following number of spines per cerarius (starting anteriorly): (1) 3, (2) 3 or 2, (3) 2, 3, or 4, (4) 2, (5) 2, (6) 3 or 2, (7) 2, (8) 2, (9) 2, (10) 2, (11) 2 or 3, (12) 2 or 3, (13) 3, (14) 3, (15) 3, (16) 3, (17) 2; each cerarius with a number of fairly long auxiliary setae varying from 2–6; spine areas of cerarii slightly sclerose; triangular pores in crowded groups around cerarii. Anterior and posterior ostioles large and dilated, ventral cicatrice quadrate in shape; body setae short not very numerous and fairly evenly distributed; antennae eight-segmented in the following proportions: (1) 16, (2) 17, (3) 12, (4) 8, (5) 9, (6) 10, (7) 9, (8) 23; rostrum dimerous; acutely pointed; much longer than broad; terminal segment about twice length of basal; rostral loop extending to or beyond bases of hind legs; eyes small but well defined. Legs normal; relatively slender; many translucent pores present on hind femora and tibiae; tarsal and ungual digitules both knobbed; segments of limbs in the following proportional lengths:—

| | Trochanter. | Femur. | Tibia. | Tarsus. |
|---|---|---|---|---|
| Fore limb . . | 23 | 48 | 40 | 20 |
| Mid limb . . | 25 | 51 | 43 | 20 |
| Hind limb . . | 26 | 55 | 55 | 25 |

Tibiae approximately twice the length of tarsi. Anal lobes well defined and rather heavily chitinised ventrally; anal lobe setae nearly twice length of anal ring setae.

Length of adult ♀ from 1·80 mm. to 2·00 mm.; breadth from 1·20 mm. to 1·80 mm.

Type host :—Leaves of *Coffea arabica*.
Type locality :—Tanganyika Territory : Bukoba.

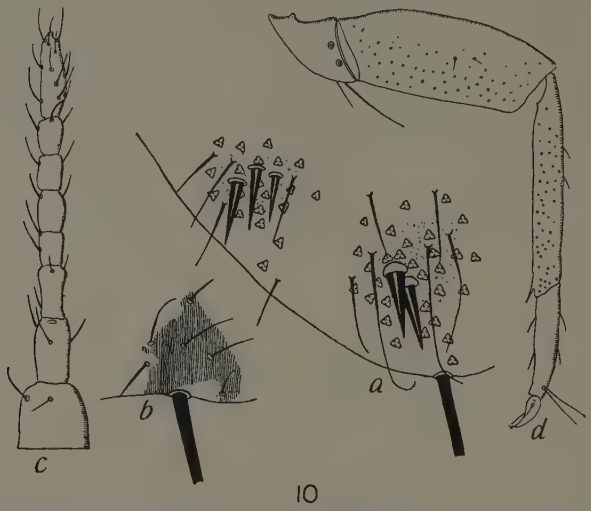


Fig. 10.—*Pseudococcus longirostralis* sp. n.—(*a*) penultimate and paranal cerarii × 250; (*b*) ventral side of paranal lobe × 250; (*c*) antenna × 57; (*d*) posterior limb × 57.

**Pseudococcus masakensis** sp. n. (fig. 11).

Adult ♀ broadly ovate; thickly coated with white wax dorsally; no distinctive pattern; no tassels; ovisac long and cottony; with seventeen or eighteen pairs of cerarii each with a pair of spines set on a small sclerose area; associated triangular derm pores very few; auxiliary setae absent. Body setae scanty but of two types : (1) long and fine; (2) short and spiniform and occasionally grouped in pairs which if marginally situated might be regarded as true cerarian spines; eyes protuberant; antennae relatively short and 7-segmented in the following relative proportions : (1) 12, (2) 9, (3) 8, (4) 9, (5) 6, (6) 9, (7) 21. Anterior and posterior ostioles inconspicuous but the posterior distinctly longer than the anterior pair; ventral cicatrice not detected; rostrum dimerous, stout; greatest breadth approximately two-thirds length; rostral loop short; legs slender and rather small; segments in the following relative proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. |
|---|---|---|---|---|
| Fore limb . . . | 18 | 23 | 25 | 19 |
| Mid limb . . . | 18 | 31 | 28 | 20 |
| Hind limb . . . | 20 | 35 | 31 | 20 |

Ungual digitules stouter than tarsals, knobbed and slightly longer than claw; tarsal digitules setiform and with a smaller knob than unguals; anal lobes well developed and chitinised dorsally; anal ring setae as stout as caudal setae.

Length of adult ♀ 1·40 mm. to 2·00 mm.; breadth from 1·20 mm. to 1·50 mm.

Type host :—Roots of *Themeda triandra* Forsk.
Type locality :—Uganda : Mile 60, Bukoba–Masaka Road.

Fig. 11.—*Pseudococcus masakensis* sp. n.—(*a*) three posterior cerarii × 250; (*b*) anal lobe, ventral aspect × 250; (*c*) posterior limb × 57; (*d*) antenna × 57.

## **Annulococcus** gen. n. (fig. 12).

Pseudococcine forms with 9-segmented antennae; rostrum apparently monomerous; claws without denticle; circular multilocular pores of two sizes generally distributed over derm; minute imperfectly shaped triangular pores present; only two pairs of well-defined cerarii situated in the posterior abdominal region; anal ring with six setae; anterior and posterior pairs of dorsal ostioles present; four ventral cicatrices occur in linear longitudinal arrangement on abdomen.

The presence of triangular pores and the absence of claw denticles preclude the accommodation of this form in *Heterococcus* Ferris.

Type of the genus *A. ugandaensis* sp. n.

### **Annulococcus ugandaensis** sp. n.

Adult ♀ with a dusting of white wax (little more than a wax-like bloom); no tassels; body content pale strawberry in colour; ovisac not seen. Adult ♀ elongate almost parallel-sided with two pairs of cerarii situated in the posterior region of the abdomen; each cerarius with a pair of rather long, slender spines without groupings of pores around their bases, two or three long auxiliary setae in the immediate vicinity of the cerarii; large number of multilocular pores of two sizes present on derm; loculi of the larger pores vary in number from 6 to 9; numerous minute pores occur which are obscurely triangular in shape; minute tubular ducts also open on to derm. Eyes large and protuberant; rostrum very short and broad; broader than long; monomerous; rostral loop very short. Antennae 9-segmented in the following proportions: (1) 16, (2) 16, (3) 10, (4) 10, (5) 11, (6) 9,

(7) 8–5, (8) 8, (9) 13. Legs perfect, stout; claw without denticle; ungual digitules longer than claw and knobbed; tarsals very filiform, do not extend beyond claw and not knobbed; hind tibiae markedly dilated; segments of limbs in the following relative proportions:

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 21 | 48 | 47 | 22 | 5 |
| Mid limb . . | 25 | 47 | 56 | 26 | 6 |
| Hind limb . . | 27 | 58 | 64 | 25 | 6 |

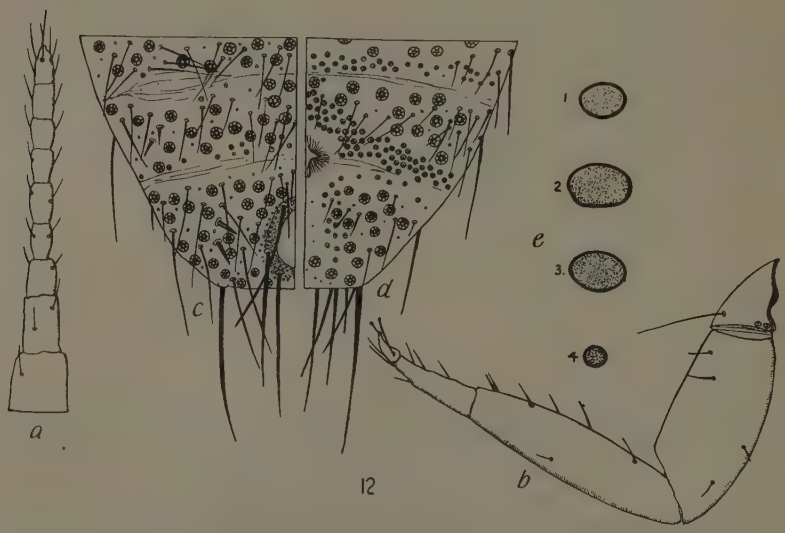


Fig. 12.—*Annulococcus ugandaensis* sp. n.—(*a*) antenna × 57; (*b*) hind leg × 57; (*c*) posterior segments of abdomen, dorsal aspect × 150; (*d*) posterior segments of abdomen, ventral aspect × 150; (*e*) ventral cicatrices showing shape and relative proportions. 1 to 4 from before backwards.

Anal lobes almost absent; caudal setae slightly stouter than anal ring setae; pores of anal ring small and in two irregular series. Body setae long and numerous dorsally especially posteriorly, shorter and sparser ventrally; four ventral abdominal cicatrices occur in median linear longitudinal arrangement (fig. 12 *e*, 1, 2, 3, 4, 1); the most posterior (fig. 12 *e*, 4) much the smaller; spiracles rather large; hind pair larger than anterior pair. A pre-adult specimen collected in the same locality possessed 7-segmented antennae; only one ventral cicatrice; no genital aperture; waxpores and body setae greatly reduced in number.

Length of adult 2·30 mm.; breadth 1·10 mm.

Type host:—Roots of grass (undet.).
Type locality:—N. Uganda: Mile 90, Jinja–Tororo Road.

### **Rhizoecus graminicola** sp. n. (fig. 13).

Adult ♀ elongate; ovisac cottony and envelopes female; derm powdered with white wax; with a pair of cerarii in the paranal region; each consists of a pair of long slender setae without groupings of pores around them. Anal lobes absent; anal ring of the *Rhizoecus* type. Most abundant type of dermal pore is a minute subtriangular one; multilocular pores occur only in the posterior ventral abdominal region; trilobate pores

and minute tubular ducts sparsely present. Eyes small but protuberant; rostrum dimerous, stout; breadth equal to three-fourths of length; anterior and posterior ostioles present but not conspicuous; one medio-ventral pore present; spiracles small and anterior pair smaller than posterior. Antennae 6-segmented; geniculate short and stout; three falciform setae on terminal segment; one on the second last segment; segments in the follow-

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Fig. 13.—*Rhizoecus graminicola* sp. n.—(*a*) posterior segments of abdomen, dorsal aspect × 150; (*b*) antenna × 114; (*c*) median ventral ostiole × 52; (*d*) posterior limb × 114.

ing proportions: (1) 7, (2) 4, (3) 5, (4) 2, (5) 2, (6) 10. Legs small, perfect, segments in the following proportions:—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 8 | 16 | 11 | 10 | 4 |
| Mid limb . . | 8 | 15 | 11 | 8 | 4 |
| Hind limb . . | 8 | 17 | 15 | 11 | 4 |

Ungual digitules slightly longer than claw and knobbed; tarsal digitules very short and not knobbed.

Length of adult 2·50 mm. to 2·80 mm.; breadth 1·20 mm. to 1·50 mm.

Type host:—Roots of grasses.

Type locality:—Kenya: Kilindini, Mombasa.

**Rhizoecus albus** sp. n. (fig. 14).

Adult ♀ elongate; dusted with white wax; short anal tassels only; colour of body content white; ovisac not observed. A pair of cerarii in the paranal region only; each with a pair of elongate spines; tendency of pores to group around cerarii slight; anal lobes only slightly developed; caudal setae about one-third as long again as the cerarian spines; anal ring setae relatively short and stout. Triangular pores evenly and fairly numerously distributed over the entire body; a small number of trilobate pores present

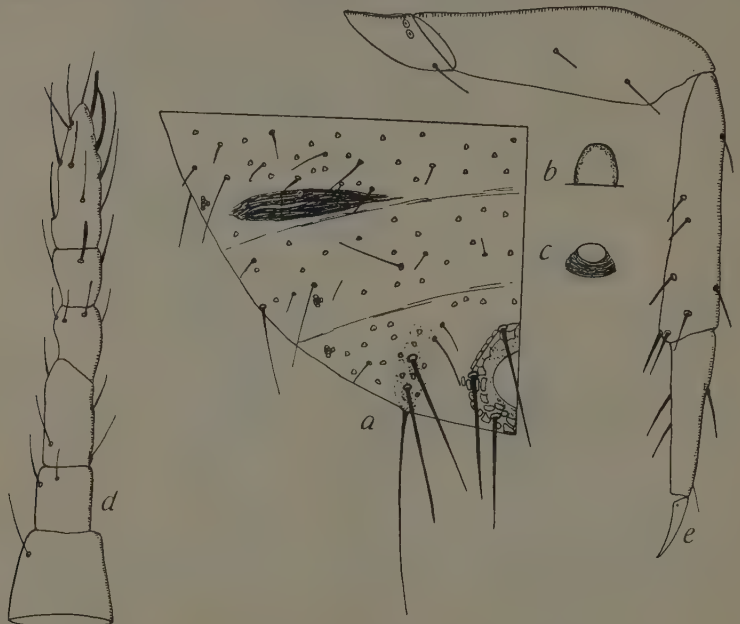


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Fig. 14.—*Rhizoecus albus* sp. n.—(*a*) posterior segments of abdomen, dorsal aspect, left side × 150; (*b*) eye × 52; (*c*) medio-ventral ostiole × 52; (*d*) antenna × 114; (*e*) posterior limb × 114.

in linear longitudinal arrangement. Body setae slender and very sparse; eyes small but very protuberant; antennae 6-segmented and characteristically curved at 4th segment; the terminal segment bears four falciform setae and the 5th segment bears one; segments are arranged in the following proportions: (1) 11, (2) 8, (3) 13, (4) 7, (5) 7, (6) 18. Rostrum dimerous; breadth equal to about two-thirds of length; rostral loop short; the lips of the anterior and posterior ostioles markedly sclerose. Legs slender in the following proportions:—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb | 14 | 30 | 22 | 18 | 6 |
| Mid limb | 14 | 31 | 35 | 17 | 7 |
| Hind limb | 15 | 35 | 33 | 19 | 8 |

A pair of spurs at the distal extremities of all tibiae; ungual digitules absent; tarsal digitules short and fine; claws long and slender and not strongly curved.

Length of adult ♀ from 1·40 mm. to 2·10 mm.; breadth from 0·60 mm. to 1·50 mm.

Type host :—Roots of *Panicum maximum* Jacques.
Type locality :—KENYA : Mbaraka Road, Mombasa.
Other records :—From roots of undetermined grasses in same locality.
The curvature of the antennae in the region of the 4th segment, the markedly protuberant eyes and the crassate lips of the dorsal ostioles, are characteristic features of this species.

**Ripersia littoralis** sp. n. (fig. 15).

Adult ♀ broadly ovate; enclosed during life in a white silky ovisac; tassels absent; body content greenish-brown; with a single pair of cerarii situated in the paranal region

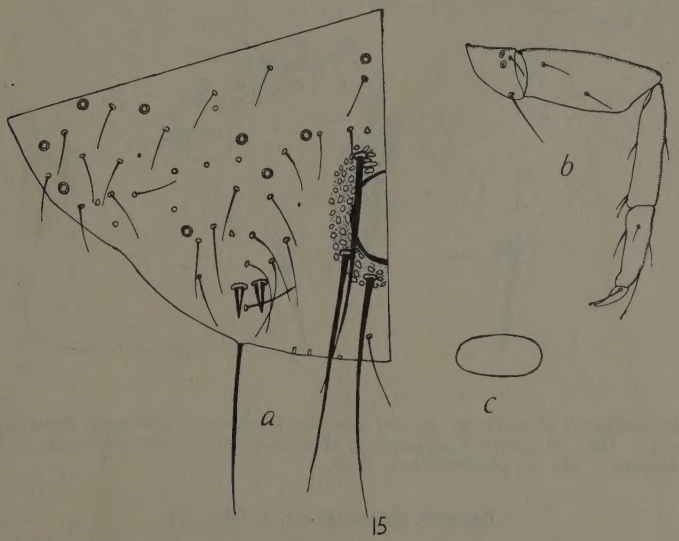


FIG. 15.—*Ripersia littoralis* sp. n.—(*a*) paranal region, dorsal view, left side × 150; (*b*) posterior limb × 57; (*c*) a ventral cicatrice × 50.

each with two spines together with a number of long auxiliary setae; no aggregations of pores in the region of the cerarii. Circular multilocular pores sparsely present in all parts of derm but most numerous posteriorly in the region of the genital aperture; triangular pores not numerous; body setae short and sparse except in paranal region. Anal lobes undeveloped; cells of the anal ring large but of the beaded type; anal ring setae noticeably long and stout; longer and stouter than caudal setae. Anterior and posterior dorsal ostioles small; a pair of irregularly oval ventral cicatrices present; anterior spiracles slightly smaller than posterior pair. Rostrum monomerous; greatest breadth approximately two-thirds length; rostral loop short. Eyes present; antennae somewhat geniculate; 6-, 7-, or 8-segmented; segments show considerable variation in length; bases of antennae widely separated. Legs relatively small; segments in the following proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 15 | 31 | 18 | 15 | 6 |
| Mid limb . . | 16 | 28 | 21 | 15 | 6 |
| Hind limb . . | 18 | 34 | 28 | 18 | 6 |

Tarsal digitules somewhat setiform and minutely knobbed; ungual digitules slightly longer than claw.

The embryos reach an advanced stage of development in the body of the parent.

Type host :—Roots of grass.

Type locality :—Kenya : Mtwapa Road, Mombasa.

The stout and long anal setae and the pair of ovoid ventral cicatrices are distinctive features of this species.

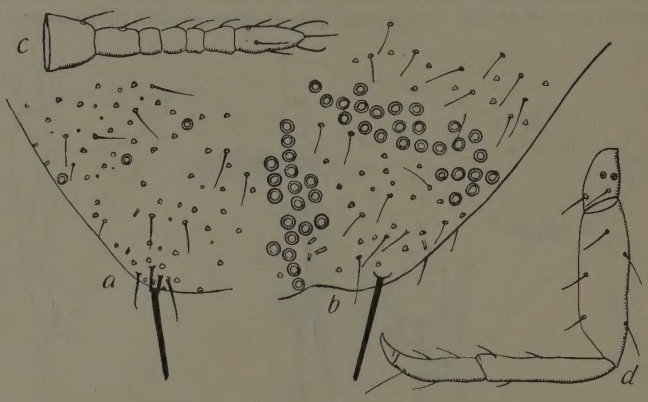


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Fig. 16.—*Ripersia themedae* sp. n.—(*a*) posterior segments of abdomen, dorsal view, left side × 150; (*b*) posterior segments of abdomen, ventral view, right side × 150; (*c*) antenna × 57; (*d*) posterior limb × 57.

**Ripersia themedae** sp. n. (fig. 16).

Appearance in life unknown; adult ♀ elongate oval in shape without definite cerarii although there are three or four rather stout spines in the paranal area; derm rather densely crowded with triangular pores; many multilocular pores occur at the intersegmental borders in the posterior ventral region of the abdomen and a few are present on the dorsal surface. Body setae fine, short, and sparse; anal lobes not developed; caudal setae stouter and longer than anal ring setae; anal ring normal with a double ring of beaded cells; anterior and posterior dorsal ostioles present; ventral cicatrice small and ovoid in shape; eyes only slightly protuberant. Antennae 7-segmented in the following proportions : (1) 12, (2) 11, (3) 5, (4) 6, (5) 4, (6) 8, (7) 17. Rostrum long and stout; greatest breadth approximately four-fifths of length; rostral loop short. Legs perfect; segments of limbs in the following proportions :—

| | Trochanter. | Femur. | Tibia. | Tarsus. | Claw. |
|---|---|---|---|---|---|
| Fore limb . . | 18 | 35 | 25 | 18 | 5 |
| Mid limb . . | 18 | 35 | 28 | 21 | 5 |
| Hind limb . . | 18 | 39 | 33 | 20 | 5 |

Total length of adult ♀ 1·80 mm. to 2·20 mm.; breadth 1·25 mm. to 1·70 mm.

Type host :—Roots of *Themeda triandra* Forsk.

Type locality :—UGANDA : Mile 60, Bukoba–Masaka Road.

A remarkable feature of this species is the large number of clustered multilocular pores in the posterior ventral abdominal region.

I wish to express my indebtedness to Mr. E. E. Green for commenting on specimens submitted to him and for the loan of material, and to Dr. A. D. Imms, F.R.S., in whose laboratory the work described here was carried out.